**BIO 500 Special Topics: Human Ecology – 3 Hours**

 I. Purpose: a study of various aspects of human ecology such as

 environmental problems associated with population growth, pollution,

 resource depletion, energy (sources and policy), endangered species,

 habitat destruction, and urban growth.

 II. Textbook: Environmental Science A Global Concern, 13th Edition,

 Cunningham & Cunningham, McGraw-Hill, 2014, ISBN 978-007-3532541

 There are six major themes in this course: 1) Introductory

 material/science, 2) Ecology, 3) Population, 4) Food, 5) Energy,

 and 6) Pollution. **All necessary material needed for this course will**

 **be supplied by the instructor.**

III. Grading: Will be based on the quality of the exercises completed.

 A = Excellent; B = Good; C = Average; D = Below Average;

 F = Unacceptable

IV. Disability Statement

 Campbellsville University is committed to reasonable accommodations

 for students who have documented learning and physical disabilities

 as well as medical or emotional conditions. If you have a documented

 disability or condition of this nature, you may be eligible for

 disability services. Documentation must be from a licensed

 professional and current in terms of assessment. Please contact the

 Coordinator of Disability Services at 270-789-5192 to inquire about

 their services.

VI. Emergency Numbers – Campus Security

 **270-403-3611 (cell)**

 **270-789-5555**

VII. Sexual Harassment Statement

Campbellsville University and its faculty are committed to assuring a

 Safe and productive educational environment for all students. In order

 to meet this commitment and to comply with Title IX of the Education

 Amendments of 1972 and guidance from the Office for Civil Rights, the

 University requires all responsible employees, which includes faculty

 members, to report incidents of sexual misconduct shared by students

 to the University’s Title IX Coordinator.

Title IX Coordinator:

 Terry VanMeter

 1 University Drive

 UPO Box 944

 Administration Building Office 8A

 Phone – 270-789-5016

 Email-twvanmeter@campbellsville.edu

 Information regarding the reporting of sexual violence and the

 resources that are available to victims of sexual violence is set

 forth at: www.campbellsville.edu/titleIX

**Items to complete - check off when complete:**

\_\_\_\_\_ Check off. I read the following sections of the textbook:

 1.3, 2.3, 3.4 & 3.5, 5.1, 2, 3 & 4, 7.1, 3, 6, & 7, 9.1, 2, & 4,

 10.6, 11.3, 15.4, 5, & 6, 16.3, 5, & 6. 18.1 & 2, 19 all, 20 all,

 21.4, 24.2, and 25.3

\_\_\_\_\_ Check off. Write a short report, 1-3 pages, on the following

 topic.

 Science: Authority, Tradition, and Revelation are three ways to

 obtain information, but, science requires credible evidence. What

 is science and when did we start thinking this way? Start with

 Copernicus and Galileo and how they defied authority & tradition.

\_\_\_\_\_ Check off. Write a short report, 1-3 pages using the following

 sources. Chapters 1 - 4 in the book *T. rex and the Crater of Doom,*

DVD *The Day the Mesozoic Died* & DVD *Siberian Apocalypse.* How did

 “science” discover that a large asteroid likely caused the demise

 of the dinosaurs? What is the Chicxulub Crater and the KT boundary,

 and how do they relate to the extinction of the dinosaurs. Could

 we still be struck by a rock from outer space?

\_\_\_\_\_ Check off

 Law of conservation of matter –

 1st Law of Thermodynamics –

 2nd Law of Thermodynamics –

\_\_\_\_\_ Draw a food chain and show energy flow into and out of the system

\_\_\_\_\_ What happens with Biological magnification (amplification) of

 substances like DDT and PCBs?

\_\_\_\_\_ Rachel Carson and the book *Silent Spring* – what did she tell us way

 back in 1962?

\_\_\_\_\_ I looked up and read about the parameters that define the major

 terrestrial biomes: desert, grassland, Eastern deciduous forest,

 boreal forest (taiga), tundra, swamp, tropical rain forest,

 temperate rain forest, chaparral, and estuary (like Chesapeake Bay

 Examples of an aquatic biome (fresh water) would be Lake Erie),

 marine biomes (salt water) would be Tampa Bay & a coral reef.

\_\_\_\_\_ Normal Borlaug (Nobel Peace Prize) coined the catchy phrase the

 Green Revolution – What did he do?

\_\_\_\_\_ Monsanto and GM foods – Watch the DVD *Pandora’s Box* and summarize

 the message:

\_\_\_\_\_ Watch the DVD *The Future of Food* and summarize the message:

\_\_\_\_\_ Alien species in Kentucky. What is Kudzu?

\_\_\_\_\_ Extinction in Kentucky. What was the Passenger Pigeon?

\_\_\_\_\_ On another piece of paper, draw the nitrogen cycle and the carbon-

 oxygen cycle – check off here.

\_\_\_\_\_ The limiting factor is the essential in shortest supply – apply to

 a desert.

\_\_\_\_\_ Apply to a tundra.

\_\_\_\_\_ Lily pad riddle: A lily pad doubles every day and the pond is

 completely covered on the 30th day – on what day was it half

 covered? Write your answer here: \_\_\_\_\_\_\_\_\_

\_\_\_\_\_ What is a climax ecosystem?

\_\_\_\_\_ What is secondary succession as applied to the ecosystem?

\_\_\_\_\_ What is the current estimate for the population of the earth?

 \_\_\_\_\_\_. It is growing at \_\_\_\_\_\_% each year which adds \_\_\_\_\_\_

 million people yearly to the total.

\_\_\_\_\_ Complete this on another sheet of paper. Use the Population

 Reference Bureau Data Sheet for 2014 to look up data on two

 countries – Italy, a rich, industrialized country and Niger a poor,

 agricultural country. Make a chart with birth rate per 1000, death

 rate per 1000, percent growth rate, total fertility rate (average

 number of children per woman), percent under 15 years of age. You

 can add another column, Double Time, by dividing the number 70 by

 the % growth d(not decimal equivalent) – if growth continues as

 reported, the population will double in this time frame.

\_\_\_\_\_ Check off here, but complete on another piece of paper. Using the

 text and other sources, come up with an explanation why these

 countries are so different with their population growth. Just 3 or

 4 reasons, not a treatise.

\_\_\_\_\_ If we could bring the TFR down to about 2.1 children per female,

 growth would eventually stop. This is called replacement. What

 is ZPG, zero population growth?

\_\_\_\_\_ I watched the video on population growth, and here are my comments:

\_\_\_\_\_ Only two ways to slow/stop population growth – either the birth

 rate goes \_\_\_\_\_\_ or the death rate will go \_\_\_\_\_\_\_\_.

\_\_\_\_\_ Birth Control: Most are aware of birth control pills, condoms,

 vasectomies and tubal ligations; however, these might not be

 appropriate for poor countries. I looked up and read about

 Norplant, hormone IUD, the Patch, and Depo Provera which are longer

 lasting methods perhaps more appropriate for poor countries.

\_\_\_\_\_ \_\_\_\_\_\_\_ is the % failure rate for the rhythm method which is

 approved by the Catholic Church. Failure rates are for 100 woman-

 years of use – 100 women using the method for a year, so you can

 get a % failure rate.

\_\_\_\_\_ Ru-486 is a chemical method of performing an \_\_\_\_\_\_\_.

\_\_\_\_\_ Momentum: tendency to stay in motion once placed in motion

 M = mass x velocity In terms of population Mass = \_\_\_\_\_\_\_\_\_\_

 and Velocity = \_\_\_\_\_\_\_\_\_\_\_\_\_\_. Hard to stop population growth!!

\_\_\_\_\_ Many demographers, individuals who study population growth, are

 of the opinion that the single biggest reason population continues

 to climb is the low status of women. I looked up and read about

 the status of women in Saudi Arabia.

\_\_\_\_\_ Protein deficiency disease is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 Marasmus is not getting enough calories.

\_\_\_\_\_ I read about these two nutritional deficiency diseases and observed

 some images of both.

 All protein is not created equal! Some is high quality and some is

 low quality. Explain why this is so and identify sources of

 both.

\_\_\_\_\_ In 1798 Thomas Malthus wrote a short essay about population and

 food – what was his conclusion?

\_\_\_\_\_ Aquaculture? What is it, and what are some success stories?

\_\_\_\_\_ Mariculture? What is it and what are some success stories?

\_\_\_\_\_ Genetically modified foods? What are they? Am I eating them?

\_\_\_\_\_ What is Bt corn?

\_\_\_\_\_ What is Roundup-ready Soybeans? Who makes this as well as the

 Roundup?

\_\_\_\_\_ 10-10-10 has 10% \_\_\_\_\_\_\_\_, 10% \_\_\_\_\_\_\_\_\_, and 10% \_\_\_\_\_\_\_\_\_?

\_\_\_\_\_ What is a pre-emergent herbicide, and what does it have to do with

 no-till farming? Name one used on corn:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ Since 1950 population has doubled; however, food production has

 tripled. In the long run, will more food solve the food

 problem? Explain why not.

\_\_\_\_\_ In terms of energy, the three, big fossil fuels are:

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ What is OPEC: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Name some members that are located around the

 Persian Gulf:

\_\_\_\_\_ Every day the U.S. uses about \_\_\_\_\_\_\_ million barrels of oil.

\_\_\_\_\_ We are importing less due to increased domestic production;

 however, we still import about \_\_\_\_\_\_%.

\_\_\_\_\_ We buy most of our oil from #1 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ,#2 \_\_\_\_\_\_\_\_\_\_\_\_

 and #3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (top 3 sources)

\_\_\_\_\_ Look up EPA mileage estimate for a Prius -vs- Chevrolet Suburban.

 Toyota Prius \_\_\_\_\_\_\_mpg vs Suburban \_\_\_\_\_\_mpg

\_\_\_\_\_ The Prius is a hybrid car – what does that mean?

\_\_\_\_\_ Brazil has experimented with switching their transportation system

 from petroleum-based gasoline to ethanol (an alcohol) derived from

 what crop? \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ Coal is mostly burned to produce electricity; however, it produces

 the most air pollution of the three main fossil fuels. Which two

 states have the largest coal reserves? (Hint: not KY or WV!)

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ A process called “fracking” has opened up large reserves of both

 natural gas and petroleum here in the USA. What is “fracking”?

\_\_\_\_\_ The most famous equation of the 20th century is Einstein’s

 E = \_\_\_\_\_\_. It shows the conversion of mass to \_\_\_\_\_\_\_\_\_\_\_.

\_\_\_\_\_ Nuclear power was supposed to make electricity too cheap to meter.

 Well, that didn’t work out; however it is attractive because it

 produces no air pollution. The energy in the nucleus is released

 when an atom of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (an element) is split.

\_\_\_\_\_ Many are afraid of nuclear power because of three, well publicized,

 well-publicized accidents. Identify these accidents:

 One near Harrisburg/Hershey, PA:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 The second in the Ukraine of the former USSR:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 And a third in Japan caused by a giant Tsunami:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ The worst kind of accident at a nuclear power plant is called a

 LOCA. A LOCA is a \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_

 This was sensationalized in the movie China Syndrome.

\_\_\_\_\_ I read the following and looked up isotopes, fission, chain

 reaction and half life.

 Isotope –

 Fission –

 Chain reaction –

 Half-life -

 There are 92 natural elements in the earth’s crust, hydrogen to

 uranium. The numbers, 1 to 92, are determined by the number of

 protons in the nucleus – hydrogen has 1 and uranium has 92.

 This is known as the atomic number. The addition of neutrons to

 the nucleus does not change the “number”; however, it changes

 the atomic weight. Elements with the same atomic number and

 different atomic weights are known as isotopes. Uranium has two

 main isotopes, U235 (0.7% of the total) and U238 (99.3% of the

 total). The 238 version of uranium will not split (called

 fission); however, the 235 version will split if it captures a

 neutron and becomes U236. This form of uranium is extremely

 unstable and wants to fly apart; however, 0,7% is not enough to

 support a chain reaction (split after split, etc.).

\_\_\_\_\_ At Paducah, KY we used to increase the % of u235 by removing some of

 the U238? The term for this is: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ Currently, we are concerned that \_\_\_\_\_\_\_\_\_\_ (a country) wants to

 increase the % U235 to make bomb-grade uranium.

 To make a fuel rod for a nuclear power plant the % U235 needs to be

 about \_\_\_\_\_\_\_\_%. About \_\_\_\_\_\_% is needed to make a nuclear bomb?

\_\_\_\_\_ Nuclear waste is dangerous because it has such a long half-life.

 What was being built at Yucca Mountain, Nevada? The current

 administration stopped construction on this project.

\_\_\_\_\_ What is at Maxey Flats, Kentucky? This is in Fleming County.

\_\_\_\_\_ Currently, there is a lot of controversy about the construction of

 a pipeline which will deliver oil from Canada to Texas. What is

 the name of this pipeline project:

\_\_\_\_\_ This pipeline is to carry oil from an oil sand deposit at

 Athabasca, Canada (Alberta – Northeast of Edmonton). Check off:

 I looked up Athabasca on a map of Canada.

\_\_\_\_\_ The hydrocarbon at Athabasca is not really “oil” – it is called

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and is very thick.

\_\_\_\_\_ Complete the statement - It is estimated that the amount of oil in

 Canada’s oil sands is equal to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ Identify some environmental concerns people have about the Keystone

 Pipeline.

\_\_\_\_\_ Alternative energy sources: Solar – identify the TWO big

 disadvantages that make it expensive.

\_\_\_\_\_ Wind energy – where is this even feasible?

\_\_\_\_\_ I read about and looked at images of the Ivanpah solar power plant

 outside Las Vegas.

\_\_\_\_\_ Pollution: a pollutant is anything that degrades the environment-

 examples include air, water, solid wastes, toxic chemical & noise

 What does it mean if we say a pollutant is biodegradable? + some

 examples

\_\_\_\_\_ What does it mean if we say a pollutant is persistent? + some

 examples

\_\_\_\_\_ What does it mean if few say a pollutant is permanent? + some

 examples

\_\_\_\_\_ On another sheet of paper give a short (really short) history of

 the Hooker Chemical Company and the Love Canal.

\_\_\_\_\_ Do the same thing with Minamata Disease.

\_\_\_\_\_ Photochemical smog is the most common air pollution in the U.S.

 How is it formed, and what is in it?

\_\_\_\_\_ What is put on the exhaust system of our cars to help control this

 type of air pollution?

\_\_\_\_\_ LA has the worst air pollution in the U.S. because they often have

 an “inversion layer” that traps pollutants. What is an inversion

 layer in the atmosphere?

\_\_\_\_\_ Acid rain forms when oxides of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and oxides of

 \_\_\_\_\_\_\_\_\_\_\_\_ get into the air and combine with water to form

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\_\_\_\_\_ There are skeptics about climate change; however, scientists are in

 agreement that it is real, and that we are causing it. The

 “Greenhouse” effect happens when gases like \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_ get

 into the atmosphere and trap heat from the sun. If nothing is

 done, one of these gases, \_\_\_\_\_\_\_, will double pre-industrial

 levels by 2050.

\_\_\_\_\_ Death of Lake Erie (cultural eutrophication) – I read about how

 fertilizer runoff, untreated sewage , and industrial wastes

 impacted Lake Erie. Decomposition processes in the lake removed

 much of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the water causing the fish to die.

\_\_\_\_\_ Destruction of the ozone layer – The ozone layer high up in the

 atmosphere protects us from harmful \_\_\_\_\_\_ rays from the sun.

 Ozone, which is O3, was (is) being broken down by chemicals such as

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\_\_\_\_\_ What was the worldwide agreement concerning these chemicals?

\_\_\_\_\_ I read about the ozone hole that developed over Antarctica.

\_\_\_\_\_ The Valley of the Drums in Bullitt County, KY was an EPA Superfund

 Site. I read about and looked at images of this site.

\_\_\_\_\_ What is the Superfund? Are there any Superfund sites in Kentucky?

\_\_\_\_\_ In addition to the DVD/videos previously noted, There are several

 additional to watch and summarize.

 An Inconvenient Truth – Al Gore’s production

 Who Killed the Electric Car

 Saved by the Sun

 Climate of Doubt – 1st part only, you will get the picture

 Food, Inc.

 Future of Food

 Uranium: Twisting the Tail of the Dragon

\_\_\_\_\_ Written Report on chapters 1 - 8 of the Meaning of the 21st

 Century by James Martin.